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Just like home: Nasa finds Earth's 'first cousin'

Alan Yuhas New York

Scientists on the hunt for extraterrestrial life have discovered "the closest twin to Earth" outside the solar system, Nasa has revealed in a press conference introducing Earth's "older, bigger first cousin".

Working from four years' worth of data from the Kepler space telescope, researchers from Nasa, the Seti Institute and several universities announced the discovery of the new exoplanet, named Kepler 452b, along with 12 possible "habitable" exoplanets and 500 new candidates in total.

Kepler 452b is "the closest twin to Earth, or the Earth 2.0" that has appeared in the Kepler dataset so far, said John Grunsfeld, associate administrator for Nasa's science mission directorate.

"This is the first possibly rocky, habitable planet around a solar-type star," said Jeff Coughlin, a scientist at the Seti Institute, which searches for signs of extraterrestrial life. All 11 previously discovered exoplanets of a similar size and orbit travel around stars that are smaller and cooler than the sun.

"It is the closest thing that we have to another place that somebody might call home," said Jon Jenkins, a Nasa scientist. The planet was like Earth's "older, bigger first cousin", he said.

The research suggests 452b has five times the mass of Earth, is about 1.5bn years older, and has gravity around twice as powerful. About 1,400 light years away, it orbits a star similar to our sun at about the same distance as Earth does, meaning it has a similar length year (385 days) and lies in the "habitable zone" where liquid water can exist on a planet.

Jenkins said they suspected the planet was rocky, probably with active volcanoes, and had a thicker atmosphere with greater cloud cover than Earth.

But although 452b has more in common with Earth than any exoplanet yet discovered, its star is 1.5bn years older, 4% more massive and 20% brighter than our own. As stars age they grow in mass and energy, casting more heat at the objects in their orbit. Jenkins compared them to people. "When they're young they're small and dim," he said, and millennia later "they grow and they get brighter."

As a result, the new planet receives 10% more energy than the Earth, and could provide a glimpse into a burning, waterless future on Earth, the scientists said.

"Kepler 452b could be experiencing now what the Earth will undergo more than a billion years from now," said Doug Caldwell, a Seti Institute scientist.

"If Kepler 452b is indeed a rocky planet," he said, its location "could mean that it is just entering a runaway greenhouse phase of its climate history. Its ageing sun might be heating the surface and evaporating any oceans. The water vapour would be lost from the planet forever."

The scientists also found 11 other possible exoplanets that might be less than twice Earth's diameter and orbiting in habitable zones. Seven candidates appeared to orbit solar-type stars, Coughlin said.

Sifting through the Kepler catalogue will help astronomers determine the number of small, cool planets that are the best candidates for hosting life.

"We're trying to answer really fundamental questions," Grunsfeld said. "Where are we going as human beings, and of course, the really grand question, are we alone in the universe?"

The Kepler space telescope identifies possible planets by observing periodic dips in the brightness of stars as planets pass in front of them. However, confirmation of their true planetary status requires observations by other instruments, typically looking for slight shifts in the motion of the host suns.

In 2017, Nasa plans to launch the successor to the Kepler mission, a survey satellite that searches the nearest solar systems for exoplanets. Grunsfeld said that with increasingly powerful telescopes and satellites, scientists may someday be able to "make the first primitive maps of an Earth-like planet", including details of "whether they have oceans, clouds, perhaps even seasons".

Kepler 452b 'closest twin' yet found in outer space

Distant planet has cloudy climate and 385-day years

'The first possibly rocky, habitable planet around a solar-type star'

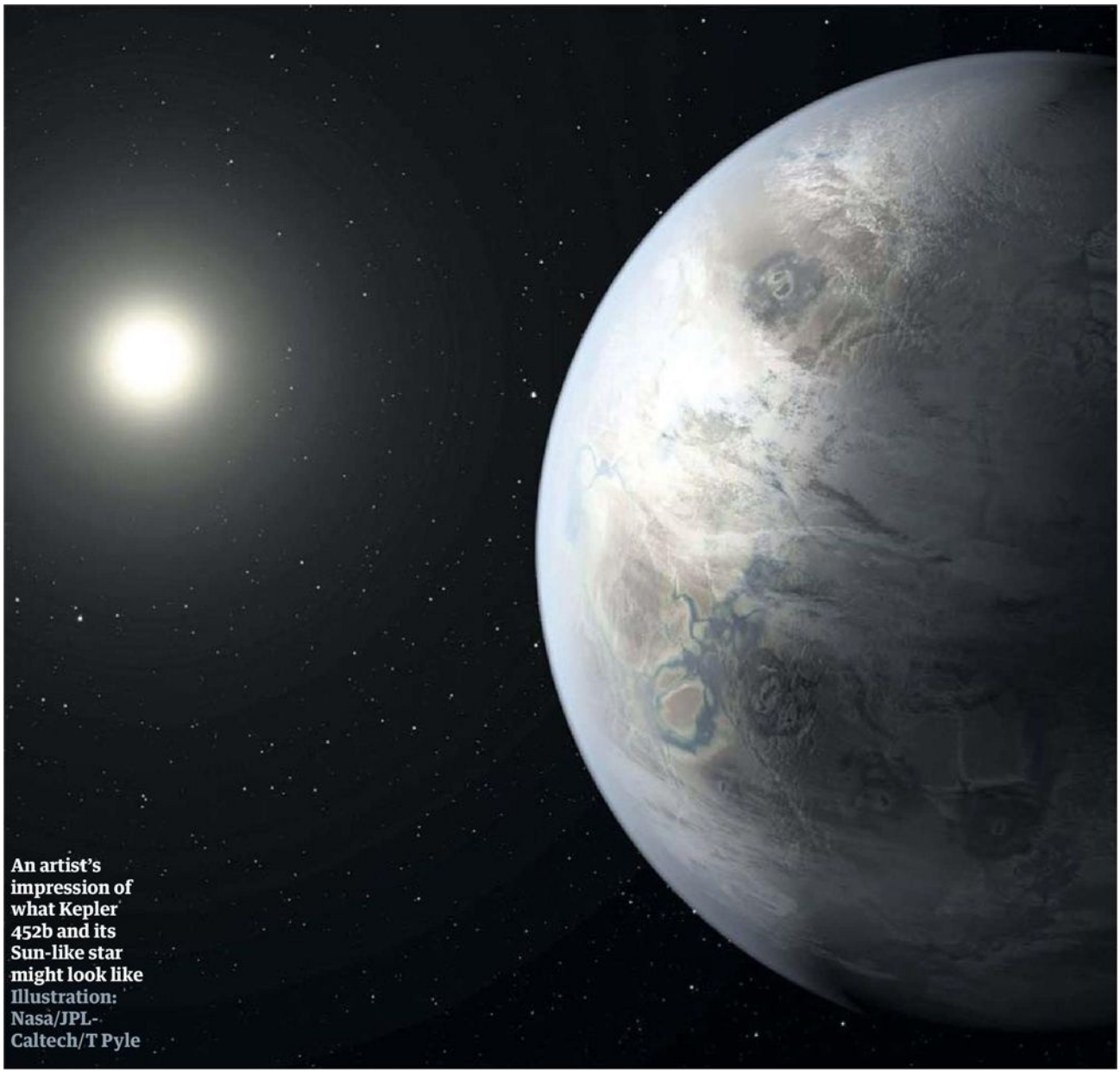
Comparisons

1,400
Approximate distance in light years between Kepler 452b and Earth

1.5bn
Years difference in age between the two planets: Kepler 452b is quite a lot older

2G
Gravity on Kepler 452b, which is about twice that experienced on Earth

Peso: 48%



An artist's impression of what Kepler 452b and its Sun-like star might look like Illustration: Nasa/JPL-Caltech/T Pyle